U.S. Department of Energy

Facilities for the Future of Science:
Methodology for Analyzing and Prioritizing Large Scale Research Infrastructure Needs

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Comparing Facilities Portfolio Planning Processes

DOE Science plan

- Is a “bottoms up” & “top down” approach
- Includes prioritization across fields of science
- 28 facilities made the cut
- While some facilities are international, most would be entirely funded by the U.S.

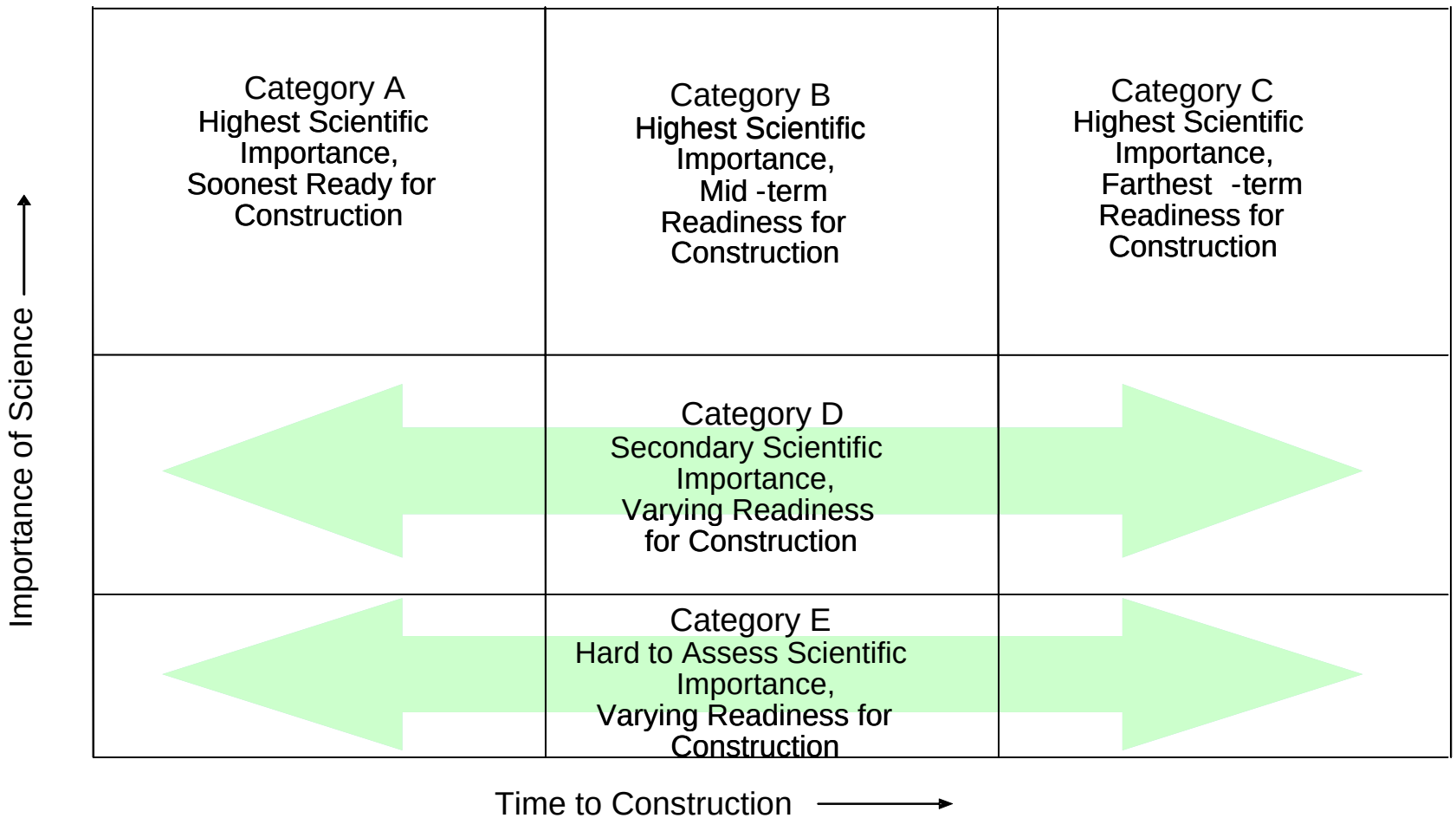
ESFRI Roadmap

- Is not a priority list
- Aim is to facilitate discussion to allow for coherent planning
- 35 facilities made the cut
- Each facility supported by at least one European Member and has great potential at pan-European level

The DOE Prioritization Process

- Tasked research program Associate Directors to develop initial lists – resulted in 46 facilities.
- Tasked program Advisory Committees to add/subtract (list grew to 53) and assess all according to two criteria:
  - Importance of the science,
  - Readiness for construction.
- Used Congressional (Biggert) authorization as optimistic, arbitrary funding envelope.
- Science Director prioritized according to importance of science and relevance to DOE mission, based on Advisory Committee assessments and consultation with Associate Directors, and fit facilities under envelope.
- Twenty-eight of fifty-three facilities made the cut.

Five Categories of SC Facilities



28 of 53 Facilities Made the Final List

1 Angstrom Free Electron Laser Major User Facility
Accelerator-based Continuous Neutron Source
Advanced Light Source Upgrade
Advanced Photon Source Upgrade
BES Instrumentation Initiative
BTeV
Center for Computational Sciences Upgrade
Charged Kaons at the Main Injector
Complex Interfacial Catalysis Facility
Component Test Facility (CTF)
Continuous Electron Beam Accelerator Facility 12 GeV Upgrade
Continuous Electron Beam Accelerator Facility II Upgrade
Double-Beta Detector (Liquid Xenon)
Energy Recovery Linac
Energy Sciences Network (ESnet)
eRHIC
Facility for Analysis and Modeling of Cellular Systems
Facility for the Production and Characterization of Proteins
Facility for the Production, Characterization, and Imaging of Exceptional Proteins and Molecular Machines
Facility for Whole Proteome Analysis
Femtosecond X-ray Source
Gamma Ray Energy Tracking Array
Green-field X-ray FEL
High-Flux Isotope Reactor Second Cold Source and Guide Hall
Inertial Engineering Test Facility (IETF)
Integrated Beam Experiment (IBX)
Integrated Research Experiment (IRE)
International Fusion Materials Irradiation Facility (IFMIF)
ITER
Joint Dark Energy Mission (JDEM)
LCLS Phase II Upgrade
LHC Accelerator Upgrade I
LHC Accelerator Upgrade II
LHC Detector Upgrade
Linac Coherent Light Source
Linear Collider
Muon Storage Ring/Neutrino Factory
National Compact Stellarator Experiment (NCSX)
National Energy Research Scientific Computing Center Upgrade
National Synchrotron Light Source Upgrade
Double-Beta Decay Underground Detector
Next-Step Spherical Torus Experiment (NSST)
Off-Axis Neutrino Detector
Plant Metabolomics Facility
Proton Decay Detector
Rare Isotope Accelerator
RHIC II
Spallation Neutron Source 2-4MW Upgrade
Spallation Neutron Source Second Target Station
Super B-Factory
Super Neutrino Beam
Transmission Electron Achromatic Microscope
UltraScale Scientific Computing Capability (USSCC)

The Prioritized List

Priority			
Near-Term			
1		FES	International Thermonuclear Experimental Reactor
2		ASCR	UltraScale Scientific Computing Capability
Tie for 3		HEP	Joint Dark Energy Mission
		BES	Linac Coherent Light Source
		BER	Protein Production and Tags
		NP	Rare Isotope Accelerator
Tie for 7		BER	Characterization & Imaging
		NP	Continuous Electron Beam Accelerator Facility 12GeV Upgrade
		ASCR	Esnet Upgrade
		ASCR	NERSC Upgrade
		BES	Transmission Electron Achromatic Microscope
12		HEP	BTeV
Mid-Term			
13		HEP	Linear Collider
Tie for 14		BER	Cellular Systems Analysis & Modeling
		BES	SNS 2-4 MW Upgrade
		BES	SNS Target Station II
		BER	Whole Proteome Analysis
Tie for 18		NP	Double Beta Decay Underground Detector
		FES	Next Step Spherical Tokamak
		NP	RHIC II
Far-Term			
Tie for 21		BES	National Synchrotron Light Source Upgrade
		HEP	Super Neutrino Beam
Tie for 23		BES	Advanced Light Source Upgrade
		BES	Advanced Photon Source Upgrade
		NP	eRHIC
		FES	Fusion Energy Contingency
		BES	High Flux Isotope Reactor Guide Hall II
		FES	Integrated Beam Experiment

Status of Facilities for the Future of Science

Initiated or in Operation:

- Leadership Computing Facilities
- GTL: Research Centers I & II
- ESnet Upgrade
- NERSC Upgrade

In Construction or Pre-Construction:

- ITER
- LCLS
- TEAM
- NSLS II
- CEBAF Upgrade

In R&D or Design Phase:

- JDEM – RIA
- Linear Collider – SNS Power Upgrade – SNS 2nd Target Station – Double Beta Decay Detector – Next-Step Spherical Torus – RHIC II
- Super Neutrino Beam – ALS Upgrade – APS Upgrade – eRHIC – HFIR 2nd Cold Source – Integrated Beam Experiment

Status of *Facilities For the Future: 20-Year Outlook*

Projected at the end of FY08

	Priority	Program	Facility		R&D	Design	Construction	Operation
Near-Term	1	FES	ITER					
	2	ASCR	UltraScale Scientific Computing Capability					
	Tie for 3	HEP	Joint Dark Energy Mission					
		BES	Linac Coherent Light Source					
		BER	~~Protein Production and Tag~~	GTL Center I & II				
		NP	Rare Isotope Accelerator					
	Tie for 7	BER	~~Characterization and Imaging~~	GTL Center I & II				
		NP	CEBAF Upgrade					
		ASCR	ESnet Upgrade					
		ASCR	NERSC Upgrade					
		BES	Transmission Electron Achromatic Microscope					
	12	HEP	BTeV		Terminated			
	13	HEP	Linear Collider					
Mid-Term	Tie for 14	BER	~~Analysis/Modeling of Cellular System~~	GTL Center I & II				
		BES	SNS 2-4 MW Upgrade					
		BES	SNS Second Target Station					
		BER	~~Whole Proteome Analysis~~	GTL Center I & II				
	Tie for 18	NP/HEP	Double Beta Decay Underground Detector					
		FES	Next-Step Spherical Torus					
		NP	RHIC II					
Far-Term	Tie for 21	BES	National Synchrotron Light Source Upgrade					
		HEP	Super Neutrino Beam					
	Tie for 23	BES	Advanced Light Source Upgrade					
		BES	Advanced Photon Source Upgrade					
		NP	eRHIC					
		FES	Fusion Energy Contingency					
		BES	HFIR Secound Cold Source and Guide Hall					
		FES	Integrated Beam Experiment					